REMARKS

This Amendment is submitted preliminary to the issuance of an Office Action in the present application and in response to the Official Action of April 24, 2006.

Claims 1-10 are pending in the application. Claims 1, 5 and 8 have been amended. Claims 2, 3, 6, 7 and 9 have been canceled. Claims 11-20 have been added. An amendment to the specification has been made. No fee is due.

It is noted that the drawings are objected to because of applicant's failure to show every feature set forth in claims 3-4, 6-9.

Claims 1-10 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Pat. No. 5,917,428 to Discenzo.

Record is also made of a telephonic interview between applicant's representative and the Examiner which took place on July 27, 2006. The Examiner is thanked for his help and assistance as well as for the courtesies extended to Counsel at that time. During the course of the interview, the present application was extensively discussed in light of the final rejection of claims 1 to 10, and as a result, applicant now submits this amendment to place the application in formal condition for allowance.

With respect to the objection to the drawings, applicant has now canceled claim 3, 6, 7 and 9. The Examiner agreed that Figs. 1 and 2 sufficiently show the presence of an infrared measuring system because of the illustration of the "detector 2" (see Figs. 1 and 2) and the "evaluation device 4" (see Fig. 2) which together define the measuring system. In addition, the Examiner also agreed that the reference to "rotating component", as set forth in claim 3, is sufficiently shown in Fig. 1 by way of the "rotor 7". The reference to "operating parameter" has been deleted from claim 8. In this context, reference is also made to Fig. 2 which depicts the operative interrelationship between the evaluation device and the fan in response to a temperature measurement by the detector.

With respect to the rejection of the original claims as being anticipated by Discenzo, applicant has amended claim 1 by setting forth the separate and spaced-apart disposition between the temperature radiation detector and the winding of the stator to effect the contactless measurement. There is no direct or indirect contact between the stator winding and the detectors. While Discenzo describes the provision of temperature sensors near the bearing components, there is still a direct connection between the sensors and the bearings, as the sensors are mounted in the motor end brackets that are in direct contact to the bearings.

The Examiner agreed that the subject matter of claim 1, as now on file, appears to be distinguishable over the prior art of record.

Applicant further submits herewith a new independent claim 11 which sets forth the separate and spaced-apart disposition between the temperature radiation detector and the rotor to effect the contactless measurement. There is no direct or indirect contact between the rotor and the detectors. Thus, claim 11 appears to be distinguishable over the prior art of record in a same manner as claim 1. Claims 12 to 15 have been added and set forth subject matter of claims 4, 5, 8 and 10.

In addition, applicant submits herewith a new independent claim 16 which sets forth the separate and spaced-apart disposition between the temperature radiation detector and permanent magnets on the rotor to effect the contactless measurement. While a reference to "permanent magnets" is absent from the original specification, applicant describes in paragraph **[0015]** of the instant specification that structure and operation of an electric machine are generally known to a person skilled in the art. It is therefore applicant's contention that the arrangement of permanent magnets on the rotor is generally known to the artisan so that no "new matter" is involved here. Reference is made, for example, also to pages 20, 21 of "ELECTRIC MOTOR Handbook, by H. Wayne Beaty and James L. Kirtley, Jr., published by McGraw-Hill, 1998, of which a copy is enclosed, and describing the attachment of permanent magnets to the rotor. In addition, reference is made to U.S. Pat. Nos. 4,674,178, issued June 23, 1987, and

4,746,827, issued May 24, 1988, of which a copy of each cover page is enclosed, and which describe the arrangement of permanent magnets on the outer periphery of the rotor.

As a consequence of the absence of any direct or indirect contact between the permanent magnets and the detectors, it is applicant' contention that claim 16 appears to be distinguishable over the prior art of record in a same manner as claim 1. Claims 17 to 20 have been added and set forth subject matter of claims 4, 5, 8 and 10.

In view of the above, each of the presently pending claims in this application is considered patentably differentiated over the prior art of record and believed to be in immediate conditions for allowance. Reconsideration and allowance of the present application are thus respectfully requested.

Should the Examiner consider necessary or desirable any formal changes anywhere in the specification, claims and/or drawing, then it is respectfully requested that such changes be made by Examiner's Amendment, if the Examiner feels this would facilitate passage of the case to issuance. If the Examiner feels that it might be helpful in advancing this case by calling the undersigned, applicant would greatly appreciate such a telephone interview.

Respectfully submitted,

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McGraw-Hill Handbooks

ELECTRIC MOTOR Handbook

H. Wayne Beaty
James L. Kirtley, Jr.

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Content

$$W'_m = \int_{\text{vol}} -\nabla\cdot(\vec{A}\times d\vec{M})\,dv + \int_{\text{vol}} (\nabla\times\vec{A})\cdot d\vec{M}\,dv$$

Then, noting that $\vec{B} = \nabla\times\vec{A}$

$$W'_m = -\oint\!\!\!\oint \vec{A}\times d\vec{M}\,d\vec{s} + \int_{\text{vol}} \vec{B}\cdot d\vec{M}\,dv$$

The first of these integrals (closed surface) vanishes if it is taken over a surface just outside the magnet, where $\vec{M}$ is zero. Thus the magnetic co-energy in a system with only a permanent magnet source is

$$W'_m = \int_{\text{vol}} \vec{B}\cdot d\vec{M}\,dv$$

Adding current carrying coils to such a system is done in the obvious way.

3.2.5 Electric machine description

Actually, this description shows a conventional induction motor. This is a very common type of electric machine and will serve as a reference point. Most other electric machines operate in a fashion which is the same as the induction machine or which differ in ways which are easy to reference to the induction machine.

Consider the simplified machine drawing shown in Fig. 3.3. Most machines, but not all, have essentially this morphology. The rotor of the machine is mounted on a shaft which is supported on some sort of bearing(s). Usually, but not always, the rotor is inside. Although this rotor is round, this does not always need to be the case. Rotor

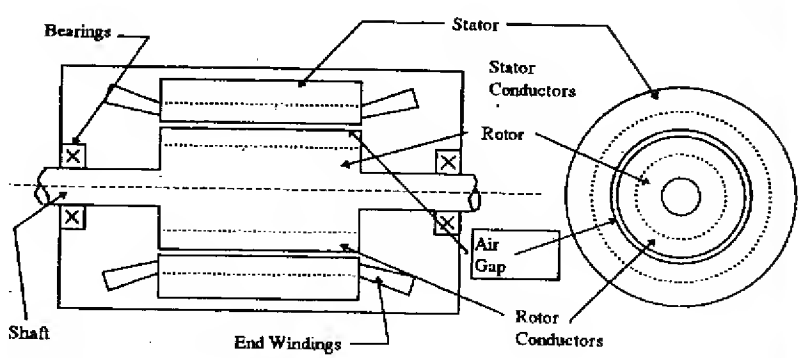

Figure 3.3 Form of electric machine.

conductors are shown, but sometimes the rotor has permanent magnets either fastened to it or inside, and sometimes (as in Variable Reluctance Machines), it is just an oddly shaped piece of steel. The stator is, in this drawing, on the outside and has windings. With most machines, the stator winding is the armature, or electrical power input element. (In dc and Universal motors, this is reversed, with the armature contained on the rotor.)

In most electrical machines, the rotor and the stator are made of highly magnetically-permeable materials: steel or magnetic iron. In many common machines such as induction motors, the rotor and stator are both made up of thin sheets of silicon steel. Punched into those sheets are slots which contain the rotor and stator conductors.

Figure 3.4 is a picture of part of an induction machine distorted so that the air-gap is straightened out (as if the machine had infinite radius). This is actually a convenient way of drawing the machine and, we will find, leads to useful methods of analysis.

What is important to note for now is that the machine has an air gap g which is relatively small (that is, the gap dimension is much less than the machine radius r). The air-gap also has a physical length ℓ. The electric machine works by producing a shear stress in the air-gap (with of course side effects such as production of "back voltage"). It is possible to define the average air-gap shear stress τ. Total developed torque is force over the surface area times moment (which is rotor radius)

$$T = 2\pi r^2 \ell\langle\tau\rangle$$

Power transferred by this device is just torque times speed, which is the same as force times surface velocity, since surface velocity is $u = r\Omega$

$$P_m = \Omega T = 2\pi r\ell\langle\tau\rangle u$$

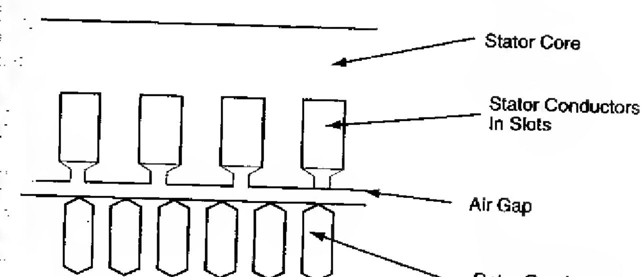

Figure 3.4 Windings in slots.

United States Patent [19]

Patel

[11] **Patent Number: 4,674,178**

[45] **Date of Patent: Jun. 23, 1987**

[54] **METHOD OF FABRICATING A PERMANENT MAGNET ROTOR**

[75] Inventor: **Navinchandra R. Patel**, Rockford, Ill.

[73] Assignee: **Sundstrand Corporation**, Rockford, Ill.

[21] Appl. No.: **899,258**

[22] Filed: **Aug. 22, 1986**

Related U.S. Application Data

[62] Division of Ser. No. 788,163, Oct. 16, 1985, Pat. No. 4,633,113.

[51] **Int. Cl.**[4] **H02K 15/14**

[52] **U.S. Cl.** **29/598**; 310/42; 310/43; 310/156

[58] **Field of Search** 29/598, 597; 310/42, 310/43, 45, 156, 261, 262, 271

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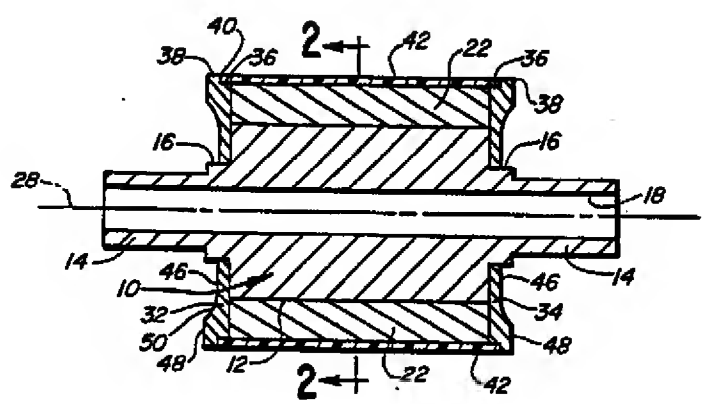
Primary Examiner—Carl E. Hall
Attorney, Agent, or Firm—Wood, Dalton, Phillips, Mason & Rowe

[57] **ABSTRACT**

Loose or frayed fibers at the axial end of a fibrous wrap **42** about the periphery of rotor hub **10** mounting permanent magnets **22** are avoided by placing steps **40** between first and second diametral sections **36, 38** in side plates **32, 34** sandwiching the magnets **22** with the wrap preventing radial displacement of the magnets and the side plates preventing axial displacement.

4 Claims, 5 Drawing Figures



United States Patent [19]

Ochiai et al.

[11] Patent Number: 4,746,827

[45] Date of Patent: May 24, 1988

[54] ROTOR FOR ELECTRIC MOTOR

[75] Inventors: Izumi Ochiai; Hideo Hashida; Yoshio Asahino; Nobuhiko Yokota, all of Tochigi, Japan

[73] Assignee: Hitachi, Ltd., Tokyo, Japan

[21] Appl. No.: 15,630

[22] Filed: Feb. 17, 1987

[30] Foreign Application Priority Data

Feb. 28, 1986 [JP] Japan 61-41745

[51] Int. Cl.⁴ H02K 21/14

[52] U.S. Cl. 310/156; 310/261; 310/271

[58] Field of Search 310/156, 261, 262, 271

[56] References Cited

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Primary Examiner—Donovan F. Duggan
Attorney, Agent, or Firm—Antonelli, Terry & Wands

[57] ABSTRACT

A rotor for an electric motor including an iron core having collar portions at both end portions thereof, and a magnet placed on the outer periphery of said iron core. The magnet is held at both end portions thereof between the collar portions.

5 Claims, 2 Drawing Sheets